DEVELOPMENT OF WEB BASED OIL & GAS SYSTEM FOR THE ASSOCIATION OF MALAYSIAN OIL & GAS ENGINEERING CONSULTANTS (MOGEC)

BY

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ABSTRACT

This web based oil & gas system was developed for The Association of Malaysian Oil & Gas Engineering Consultants (MOGEC) to establish record of work undertaken by members of the association. This system was built as a solution to the difficulties faced by companies in getting sufficient information on projects being undertaken in the oil and gas industry. With this system, normal users are able to view projects in the database by categories or choose to search for a specific project while admin is able to manage the project records from time to time. This system includes a browser, Apache Server and MySQL Server. The Web browser connects to the database for retrieval and storage of information. MySQL database Server is the database to store the data, Apache HTTP server is the server to serve the Web pages to the client's Web browser and PHP is the middleware which interconnects MySQL database with Apache Server.

ABSTRAK

Sistem Minyak & Gas Berasaskan Web ini telah dibangunkan bagi Persatuan Perunding Kejuruteraan Minyak & Gas Malaysia untuk menghasilkan satu rekod kerja yang dijalankan oleh ahli-ahli. Sistem ini telah dibina sebagai satu penyelesaian kepada kesukaran syarikat-syarikat untuk mendapatkan maklumat secukupnya bagi projek-projek yang dijalankan di dalam industri minyak dan gas. Dengan sistem ini, pengguna biasa dapat melihat kesemua senarai projek berdasarkan kategori atau membuat carian bagi sesuatu projek manakala admin boleh menguruskan rekod-rekod projek dari semasa ke semasa. Sistem ini terdiri daripada pelayar, pelayan Apache dan pelayan MySQL. Pelayar Web bersambung kepada pengkalan data untuk pencapaian dan penyimpanan data. Pelayan pengkalan data MySQL adalah pengkalan data bagi menyimpan data, pelayan Apache HTTP adalah pelayan bagi melayan halaman Web kepada pelayar Web pelanggan dan PHP adalah perantara yang menyambungkan pengkalan data MySQL dan pelayan Apache.

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PROJECT PAPER SUBMISSION FORM

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(VI)	Chapter 2:	Literature Review
(VII)	Chapter 3:	System Structure and Design
(VIII)	Chapter 4	Database Design
(IX)	Chapter 5:	Implementation
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I hereby declare that this project paper is the result of my own work, except for quotations and summaries which have been duly acknowledged.

Signature : _____ Date : 20/09/07

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CHAPTER 1 - INTRODUCTION

1.1 The Association

The Association of Malaysian Oil and Gas Engineering Consultants (MOGEC) is a non profitable organization which was founded in 1999 by six established design services engineering consultants serving the upstream oil and gas industry.

The objectives of the Association are:

- To provide a forum for discussion on issues of common interests.
- To promote co-operation among members.
- To promote the use and development of local resources in the oil, gas and petrochemical industries.
- To collaborate with local research centers and institutions to stimulate skill development in Malaysia.
- To promote the development of graduate engineers and professionals in the oil, gas and petrochemical industries.

The Association played a key role within the PETRONAS driven cost reduction initiative – CORAL by active participation and representation of the engineering industry. MOGEC involves in activities to represent, promote and defend interests of the industry to PETRONAS, Government, clients and business associates.

The main objective of this system is to establish a record of work undertaken by MOGEC members. This database will provide various benefits to members and the association as a whole by way of:

- Providing record of work undertaken by members, the varying size, complexity and work scopes indicating the capacity and capability of the members and MOGEC as a whole.
- Providing an indication of the workload of MOGEC members at any time given.
- Providing searchable database that can be used for future analysis by members to indicate trends in work scopes issued by clients etc.
- Enable members to keep track of current opportunities.

1.3 Project Development

This project development involves the design and implementation of a web based oil and gas system to meet the above mentioned objectives.

The following diagram (Figure 1) shows the different phases in developing the project.

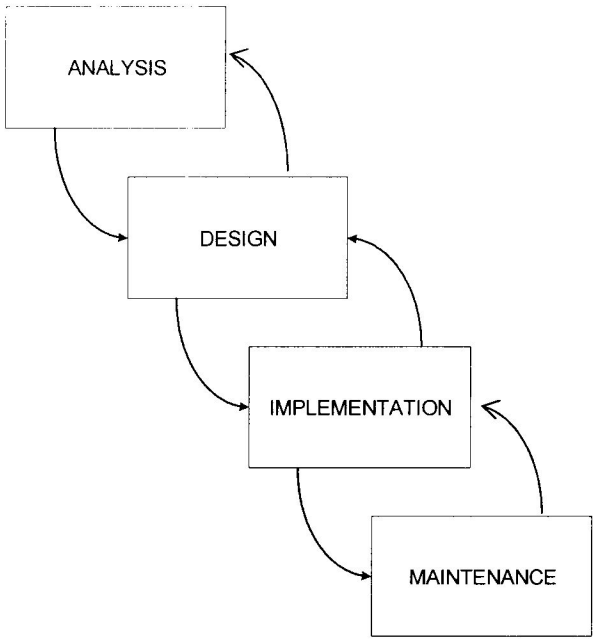

Figure 1: Project Development Process

Analysis is to determine what the users want from the proposed database system. Requirements and structure are studied according to their interrelationship and eliminating any redundancy.

Design describes how the project is to be structured. Logical design describes feature functions regardless of computer platform while physical design will take into consideration the programming language to be written and hardware platform where the system will be running.

Implementation translates the design into a system that is tested and put into use. Implementation includes coding, testing and installation.

Maintenance will be the phase where the application is systematically repaired and improved to keep the application running and beneficial.

CHAPTER 2 - LITERATURE REVIEW

2.1 Client/Server Architecture

Client/server is a computer architecture which separates functions into client and one or more servers. A client is a requester of services and server is the provider of the services.

A client application resides on user's computer and usually accepts user request and often uses graphical user interface. Server program resides on more powerful machine and used to process information. Types of server include application servers, file servers, terminal servers and mail servers.

Client/server can be used by programs within a single computer depending on the software configuration. However, it is more important when client/server programs are on different machines and linked together by a network.

The most common example of client/server architecture is the World Wide Web (WWW). When a user wish to visit a certain website on the web, the user will open a web browser, type in the URL and send it to a web server. The web server will process and returns the (HTML, PHP or ASP) page back to the web browser which then parses the data and display it in the browser.

Client/server application consists of three functional units.

- User interface
- Application logic
- Data

In 2-tier client/server, application logic can either be inside the user interface on the client side or within the database on the server side. The application logic can also be divided between the client and server. Example of 2-tier client/server systems are file servers and database servers with stored procedure.

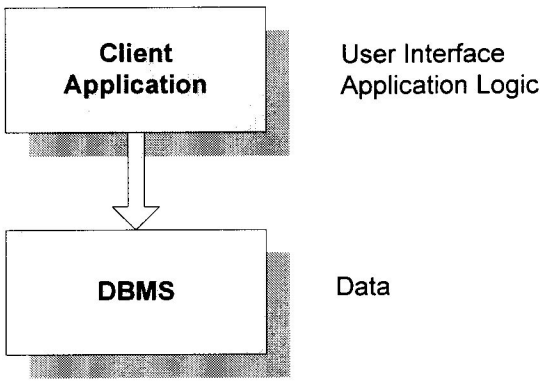

Figure 2: 2-tier architecture

2-tier application is only effective for small group of users because the performance of a 2-tier application will deteriorates as the number of user increases. Another problem with 2-tier application is that it has no flexibility. Once an application is developed, it is difficult to move some of the program functionality from one server to another and this requires manually regenerating procedural code.

3-tier application solves this problem by having a middle tier in between input/output device and DBMS server to perform number of functions. In 3-tier client/server, application logic resides in the middle tier, separates from the data and user interface. Processes are being managed and deployed separately from the user interface and database.

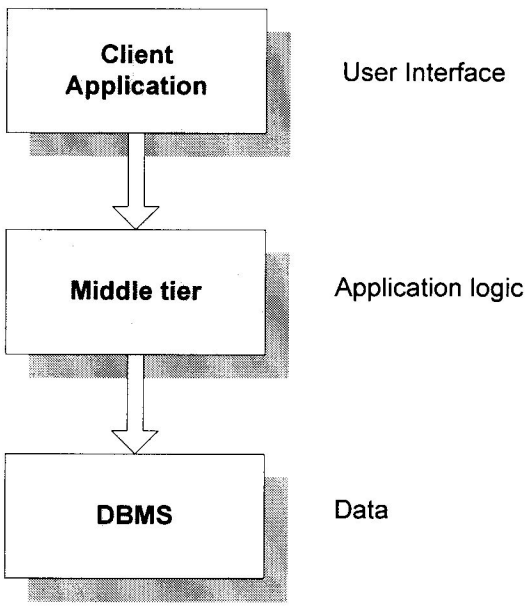

Figure 3: 3-tier architecture

3-tier client/server systems are more scalable, robust and flexible. They can also integrate data from multiple resources.

2.2 Database Model

A database is a structured collection of an interrelated data which can be shared by different application programs. In a database, there is a structural description of the type of facts that are held in the database. This description is known as database schema and it describes the objects represented in the database and the relationships among them.

A database model describes the way the data is structured to make retrieval and changes of the data more efficient. Three types of database models are:

1. Hierarchical Model

   Hierarchical model is the oldest database model. The name "hierarchical" is derived from the restriction on the parent-child relationship which is a parent entity can have multiple child entities but one child entity can only have one parent entity. Child entity is completely dependent on parent entity.

2. Network Model

   A network model is an improvement to the hierarchical model. In the network model, child entity can have more than one parent. Multiple parent entities for each child allow many-to-many relationships in addition to one-to-many relationships. *These relationships between the entities form a network line.*

3. Relational Model

   In this model, data and the way they are stored are independent of each other. Relations are made of tuples (also referred to as records or rows) and attributes (also referred to as fields or columns). Each record is identified by a column with a unique

value. Relationships in this model could be one-to-one, one-to-many or many-to-many.

Both hierarchical and network model are navigational where a navigation path is required to get the data or records of interest. This poses a problem for complex design where the user needs to understand the structure of the database to be able to use the database.

The main concept of relational model is the view of the data as a table and this has proven to be a useful concept. The relationships between data items and records are expressed through the properties of data in one or more tables and not through physical links as with hierarchical and network model and therefore the user does not need to understand the physical structure in order to use the database.

2.3 Database Management System

In an organization, different departments may require to access the same data and do changes to the data. In the conventional filing system, data are often duplicate in multiple files and stored in different format. Sometimes, the data does not agree and time is taken to resolve the problem.

Database Management System or DBMS is a software application that manages and control access to the data. Such DBMS includes dBase, Paradox, MySQL and Oracle.

These systems allow users to create, update and extract information from their databases. The biggest advantages of DBMS compared to conventional filing system are speed, accuracy, consistency and accessibility.

Typically, DBMS provides the following functions:

- The Data Definition Language (DDL)

  This portion allows the users to specify the data types and structures and the constraints on the data to be stored in the database.

- The Data Manipulation Language (DML)

  It is a set of command issued by an application program to interact with a DBMS and to perform database management. It allows users to insert, update, delete and retrieve data from the database.

Relational Database Management System in which data are organized into a series of tables (relations) that are easily reorganized for accessing data in different ways are the most widely used today.

MySQL database, the most popular open source database system in the world is a relational database management system which is fast and easy to customize. It is developed, distributed and supported by MySQL AB. SQL stands for "Structured Query Language", the most common standardized language used to access databases.

The following describes some of the most important features of MySQL.

- **Client/Server Architecture**. MySQL is a client/server system which consists of a database server (MySQL) and many clients (application programs). The clients can run on the same computer as the server or on another computer and communicate through a local network or the internet.
- **Platform Independence**. MySQL can be executed under a number of operating systems including Unix, Linux, Windows, QS/2, Solaris and MacOS.
- **Programming Languages**. MySQL has quite a number of different application programming interfaces (APIs) and libraries. They include APIs for Perl, C, C++, Java, Python, PHP and TCL.
- **Transaction**. Provides transactional and non-transactional storage engines. Transaction-safe tables have several advantages over non-transaction-safe tables. In a transaction-safe table (ISAM, HEAP, MyISAM), rollback command can be executed. If an update fails, changes will be restored. In a non-transaction-safe table (InnoDB), there is no transaction overhead and uses less memory. However, since there is no rollback command, all changes are permanent.
- **ODBC**. MySQL supports the ODBC interface connector/ODBC. This allows MySQL to be addressed by all programming languages that runs under Microsoft Windows.
- **Security**. MySQL has a system to control access to the data. The system uses a host and user-based structure to control access to specific information and the level of access to that information.

- **Speed**. MySQL is a fast database program. The time taken to respond to a request for data is as fast as or faster than many commercial RDBMSs.

2.4 Web Server

A web based method in presenting data has becoming popular as a way to reach people around the world. Web based applications are accessible anytime and anywhere there is an internet connection.

To utilize this type of approach, a web server must be used to serve the web pages to each user that connects to the application.

The following explains how a web server works.

- When a client sends a request to a web server through the web browser, the web browser will break the URL into three parts:
  - *the protocol (example : http)*
  - the server name
  - the file name
- Domain Name Server (DNS) then translates the server name into its IP address, a numeric combination that represents the site's address on the internet.
- The browser determines which protocol to use and following the protocol, the browser sends a GET request to the web server asking for the file.

- The web server will now respond to the request. It will verifies the address, find the necessary files, run the appropriate scripts, exchange cookies if necessary and returns the results back to the browser.
- The browser translates the data to HTML and displays the result to the user.

Apache is generally recognized as the world's most popular web server (HTTP server). More than sixty percent of the web servers in the world use Apache according to Web Server Survey Company called Netcraft.

The first version of Apache was developed back in 1995 based on the National Center for Super Computing Applications httpd known as NSCA httpd.

Apache was originally written for Unix but they can now run on Windows, OS/2 and other platform.

Apache provides a full range of web server features including support for http 1.1 protocol, CGI, SSL, SSI and virtual hosts. Apache also supports plug in module for extensibility. Apache is reliable, free and relatively easy to configure.

2.5 Middleware

Middleware is the class language that works closely with the web server to process requests and interacts with any programs. It is responsible to indicate the web server exactly what data to be served back to the client's browser

PHP, an example of a middleware language is a server side, HTML embedded scripting language. Server side means that PHP scripts execute on the Web server and not within the browser on the local machine while HTML embedded scripting language means that PHP statements and commands are embedded into HTML documents.

When the Web server sees PHP statements in the Web page, the server executes the statements and sends the result to the browser, just as ASP or ColdFusion. Unlike ASP and ColdFusion, PHP is an open source and cross platform language. PHP scripts can run on many different operating systems and Web servers.

A simple PHP scripts would look like the following:

```
<html>
<head>
<title> PHP Script</title>
</head>
<body>
<?php
```